REPORT RESUMES

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A SEMINAR IN BASIC PRINCIPLES OF LEARNING FOR FACULTY MEMBERS OF A SMALL PRIVATE LIBERAL ARTS COLLEGE.

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A TWO-YEAR SEMINAR IN LEARNING THEORY AND THE SOCIAL PSYCHOLOGY OF EDUCATION WAS CONDUCTED FOR A FACULTY GROUP OF A SMALL PRIVATE LIBERAL ARTS COLLEGE. EIGHT VISITING RESEARCHERS IN PSYCHOLOGY AND EDUCATION PRESENTED THEIR WORK AND DISCUSSED ITS IMPLICATIONS FOR TEACHING AND LEARNING WITH RESPECT TO THE DISCIPLINES REPRESENTED BY 22 FACULTY PARTICIPANTS. TOPICS DISCUSSED INCLUDED VERBAL LEARNING, CONCEPT FORMATION, LINGUISTICS, TEACHER EFFECTIVENESS, POST-ADOLESCENCE, CREATIVITY, AND ACHIEVEMENT MOTIVATION. THE SEMINAR ADVISED FACULTY MEMBERS ABOUT CURRENT RESEARCH AND SOUGHT TO MOTIVATE THEM TO APPLY RELEVANT FINDINGS TO THEIR RESPECTIVE TEACHING SITUATIONS. THIS MONOGRAPH IS PRIMARILY A COLLATION OF FACULTY EVALUATIONS OF THE VISITING RESEARCHERS' PRESENTATIONS. (JK)

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Final Report

Project No. 5-1191 — 24

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A Seminar in Basic Principles of Learning for Faculty Members of a Small Private Liberal Arts College

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Earlham College

Richmond, Indiana

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Preface

The research reported herein did not involve an experimental design, nor did it return quantitative data relevant to a specific problem. Rather it explored the feasibility of a type of program designed to exert a long range and basic influence on the faculty of a small private liberal arts college. While it was recognized beforehand that the impact of such a program could not be measured adequately, but would have to be assumed to some extent, the feasibility of the program was demonstrated within the limits of success specified in the proposal. The author and principal investigator wishes to express his appreciation to those in the field of psychological and educational research who participated in this rather unique program, and to the faculty members of Earlham College who showed patience and faith in the ultimate good of a program which took precious time without offering any obvious or immediate return.

Summary

This project set out to acquaint faculty members of a small private liberal arts college with research in learning and social psychology of education, including teacher effectiveness, and to give them opportunity to engage in discussions with some of the men who are doing the research. To this end, psychologists and educators involved in research in learning and teaching were invited to the campus to make presentations concerning their work and to discuss its implications for teaching and learning in the various disciplines represented by participating faculty members. These sessions were attended by a portion of the faculty, some of whom received a small honorarium in return for writing brief reports concerning the relevance of the presentations to their respective disciplines. Faculty reactions were mixed in relation to content, relevance, and value of the experiences: some sessions inspired little interest, others were successful to an unexpected degree. Reactions generally seem to indicate that such seminars are feasible, can attract interest on the part of the faculty, and can contribute to the understanding of teaching and learning on campus.

Introduction

Faculty members of colleges are subject to increasing pressure from promoters of educational services, technologies, and systems who base their claims, rightly or wrongly, on educational and psychological research. These faculty members and administrators are not able to keep abreast of developments in instructional theory and method and simultaneously keep up their own fields and deal adequately with their students. This results in a large gulf between those developing new educational technology and those potentially most affected by it. This report describes a two year program designed to acquaint faculty members of a small private liberal arts college with respect in learning and teaching, and to give them opportunity to discuss implications of this research with investigators in the field, without detracting significantly from responsibilities to their disciplines and their students. Spectacular or even obvious results were dismissed as unlikely; the main question or problem faced by this project as research was the feasibility of such a program, rather than its impact on the faculty and college; evaluation of the latter would be a much larger and more complex task.

Methods and results in anecdotal form.

In the spring of 1964, the principal investigator circulated a memorandum to the Faculty Affairs Committee of Earlham College suggesting that a faculty seminar for investigating basic aspects of learning and their relation to college teaching might be a productive component of Earlham's long range plan for improving college teaching. This idea grew out of some experience with innovations in college teaching through the Earlham College Self Instruction Project and the Great Lakes Colleges Programmed Instruction Project of which Earlham was a participating member: it evidenced a concern that the kind of introduction to theories of learning and teaching which characterized these projects was not basic or all-inclusive enough to give faculty members a broad view of the field or to enable them to judge for themselves the potential of new media and materials as they emerged.

The Faculty Affairs Committee endorsed this idea by appointing a subcommittee to work with the author to draft a proposal to the Office of Education. The resulting proposal was recommended for funding by an Office of Education panel sometime in the early summer of 1965 and the contract was negotiated in September of 1965 in the newly organized regional office in Chicago.

In its initial phase the seminar was to address itself to basic research in learning, and then to shift toward the social psychology of learning and teaching, including teacher effectiveness. The principal investigator accordingly set out to confirm previous commitments to the project and to secure additional agreements to address meetings of the seminar. While locating speakers and making plans for their appearance on campus, the investigator also undertook to inform Earlham faculty about the seminar (see Appendix A for the initial memorandum to the faculty).

The seminar was titled the "Faculty Learning Theory Seminar." Initially ten members of the faculty consented to participate in the seminar in terms of writing reports on the various presentations from the point of view of their respective disciplines; another twenty or so expressed interest in participating in the sessions without such a commitment.

A part-time secretary was supported by the project, and carried out duties in relation to communicating with participants on the faculty and with speakers from other campuses. She also arranged for rooms for the seminar sessions, refreshments, and the many other details required in such a program. This included of course meeting the speakers, housing them, arranging their schedules while on campus, publicizing their schedules, and the like.

The initial session was a briefing in learning theory (classical and operant conditioning, research in verbal learning) preceding the appearance of Professor B. J. Underwood. This session was conducted jointly by the author and Professor R. Johnson of the psychology department of Earlham.

The format for the first formal seminar set the pattern for subsequent ones. Professor Underwood sent references for advance reading, and these were made available to both participating and associate members of the seminar. The seminar itself was set for four o'clock on a weekday afternoon (the day varied) with a follow-up session in the evening for further discussion by those particularly interested in the topic. While on campus the visitor also addressed appropriate education and psychology courses, and had meals with Earlham students. Reactions of participating members were generally positive and receptive to the ideas presented. One comment which was made frequently after this and other sessions and which in a sense confirmed the validity of the topic, was that the presentation only confirmed what the faculty member had already known.

The second seminar related to concept formation, and was presented by Professor Lyle Bourne. This proved to be a bit abstract and at the same time limited for certain participating members, particularly those involved in humanities; on the other hand, it was quite stimulating and provoking for certain members in geology and biology who were dealing with concepts analagous to those used as research vehicles. In the latter cases, the seminar indicated directions for future development. It could well be that a more thorough treatment of this area might bring out relevance to other topics which seemed further removed in this particular discussion.

The third presentation to the seminar was made by a psycholinguist, Dr. David McNeil, who was suggested originally by Professor Bruner of Harvard as someone who had worked with him in carrying out his ideas (ideas which have their foundation, incidentally, in concept formation research). The same seminar format was used, except that the briefing session was omitted due to the press of faculty commitment. Memoranda announcing the Bourne and McNeil seminars are given in the Appendices, also a sample of the McNeil schedule (Appendix B). The schedule exemplifies the multiplier effect of the seminar in relation to the spreading of understanding of current research to various segments of the small private college population. Comments by faculty members, as found in the third progress report (Appendix D-3) are interesting in the light of objectives of the seminar. The reader will note that none of the participants report particular relevance of the research discussed by McNeil to their own teaching area, yet all expressed interest in the presentation and the topic. The author feels that this experience was valuable more as an example of the kind of research which can be carried out in relation to learning of complex behaviors than as a resume of research results suggestive for practice in various areas.

In the same progress report are comments on the visit of Wilbert McKeachie. Due to the nature of the presentation and the reputation of the visitor, this seminar was given before the entire faculty, with a discussion following as usual in the evening. It was successful, as evidenced by the many comments by faculty members both in and out of the seminar. Thus the seminar ended on a high note.

One aspect of the first year's seminar worth noting is the role played by the honorarium in attracting participants to the seminar. As far as could be determined, this was not a crucial factor in decisions to participate, and it was evident that many of the participants did not realize that an honorarium was involved until they received it.

Another aspect of the seminar concerns the type of faculty member who participated. There seemed to be no pattern of youth or of reputation or prestige. The participants represented the faculty generally in regard to energy, intellectual curiosity, and competitiveness in their individual disciplines.

The principal investigator spent the summer of 1966 on a project at Harvard University, returning to Earlham early in September. This precluded recruitment of speakers for the seminar for 1966-67 until fall, and it was not until the winter term that the seminar commenced with the visit of Dr. Alfred Alshuler.

The format for the seminars remained the same, since it seemed to have been a convenient one. Again the main difficulties encountered were lack of time for preparation and briefing sessions, and difficulty in seeing immediate relevance to the problems of teaching a particular subject. As evidenced by the progress reports containing reports by participants, Professors Alshuler, Sanford, Mann, and Williams, each in his turn attracted considerable interest. These presentations dealt with factors of learning and teaching more obviously related to the functions of a college professor, and general interest was higher than in some of the first year presentations. As noted in the final progress report, the visit of Richard Mann inspired an unusual amount of discussion of factors of success in college teaching and the need for a complex balance of contributing abilities. It also inspired some research related to effectiveness in teaching, using the questionnaire developed by Mann and associates at Michigan.

The questionnaire was adapted for general use (where the original was designed for use in introductory psychology) and used by a number of professors at Earlham in the spring term. Data from the questionnaires were recorded, and norms were developed for each of the six scales derived from the questionnaire. Individual norms were made available to professors in a manner which maintained the privacy of this information. This enabled individual professors to compare their scores on the six scales with norms developed at their own institution, and thus with other professors, without making the information public. Some of the data are still being processed: another time it would probably be worth it to have these data punched and processed by computer, particularly if this were to be a campus-wide program. (Protection was afforded individual faculty members by mixing up the students' questionnaires after coding them and entering the data on master lists in random order in respect to professor. This made it difficult for anyone to extract the scores for any one individual, yet possible for the secretary to accomplish if requested. Since the secretary had only code numbers and could submit these to the principal investigator in sealed envelopes, there was little likelihood of invasion of privacy.) The interest developed in this questionnaire and the data they return has been higher than expected, and also high in comparison with a similar questionnaire developed the previous year for faculty evaluation by a faculty-student joint committee (a sub-committee of the Teaching and Learning Committee at Earlham).

Findings and Analysis

Results and Findings: Results and findings have already been included in the anecdotal description of methods, due to the nature of the research being carried out. Our data is found in the reports submitted by participating members of the faculty (reproduced in the Appendices) and in the schedules and procedures described above and spelled out in further detail in other Appendices. Other results will be realized in subsequent years at Earlham.

Conclusions and Recommendations: One can conduct successfully a seminar devoted to research in learning and teaching for the faculty of a small private liberal arts college. It can create interest, and at times even enthusiasm, in a faculty that is concerned with excellence in teaching. While the amount of time faculty members can devote to such a seminar is limited, a well-structured sequence of experiences will receive adequate attention. It seems possible that our faculty would have taken advantage of additional opportunities to discuss implication (of different types of research) among themselves. They were most interested in research in teaching effectiveness at the college level, but this should not be taken to imply that presentations of more basic investigations were unrewarding.

The author, therefore, recommends that similar seminars be instituted at other similar colleges, and also that they be tried on different types of campuses.

Appendix A

Concerning the Faculty Seminar on Learning Theory and the Social Psychology of Education

This is a two year project which is designed to acquaint faculty members with basic and applied research in learning and in the area of social psychology most closely related to education at the college level. Since it is the first such seminar, one objective is to explore the procedural and conceptual problems posed by such a seminar. Since it is supported by funds from the Bureau of Research of the U.S. Office of Education, it is our responsibility to report on the seminar in such a way that other colleges and universities may profit from our experience.

The present plan is this. Psychologists involved in research in appropriate areas will be invited to campus to present findings and discuss them with faculty members. They will deal primarily with research rather than with applications to specific subject matters, although some of the latter may emerge.

The speakers will make their presentations and then participate in a discussion with faculty members who are participating on a reporting basis. Associate members of the seminar will be invited to hear the presentation and the subsequent discussion; they will also have opportunity later to discuss matters of particular interest with the speaker.

Faculty members participating on a reporting basis will meet during the following weeks to discuss implications for college teaching, and will write individual reports on implications relevant to their own disciplines. These reports will be used as the basis for progress reports to the Office of Education, and for final reports as well; they will be brief, and will represent the original conclusions of representatives of various disciplines interpreting research for themselves. Before the first speaker comes, there will be an initial presentation of general principles of learning given by members of the psychology and education departments.

A half-time secretary is provided by the contract to assist with communications, arrangements, and typing reports. Each reporting participant will be given an honorarium of one hundred dollars as partial recognition of the extra time required.

Two speakers have already agreed to address the faculty. Professor B. J. Underwood of Northwestern, recognized for his research in verbal learning, will come in November; Professor William McKeachie of Michigan will discuss research in teacher style and student reactions when he comes in May. B. F. Skinner has agreed to a tele-lecture sometime during the year; also being contacted are Professor Jerome Bruner, whose early research was in the area of concept formation, and Professor John Carroll, an educational psychologist interested primarily in linguistics. Suggestions regarding speakers will be appreciated.

Appendix B-1

Memo to: Faculty Learning Theory Seminar Participants and
Associate Members

From: M. Daniel Smith

Date: January 5, 1966

Professor Lyle Bourne of the University of Colorado may be able to be with us Wednesday, January 26. If so we will schedule a seminar from three to five p.m. that day, and a briefing on Monday, January 24 from three to four p.m. I hope to have both in Jones House. Final word on this will be forth coming soon.

We have confirmation on the visits of David McNeil(psycholinguist) on April 6 and 7; and William McKeachie (Research in college teaching) on May 11 and 12. Schedules will be circulated soon for final approval.

Appendix B-2

Coming to Earlham College on April 6 to address the Faculty Learning Theory Seminar will be David McNeil, assistant professor of psychology from the University of Michigan at Ann Arbor. His seminar presentation will deal with research in phycholinguistics and second language learning. He will also meet with students in Learning and Motivation, Educational Psychology, and Linguistics, and will discuss applied research in education with elementary education majors.

The faculty seminar meeting is at 3 p.m. in Jones House. At 7:30 p.m. he will discuss second language learning with interested faculty and students in the meeting house. His presentation to elementary majors will deal with his experience last summer with Jerome Bruner's project in elementary school social studies; it will be at 3 p.m. on April 7 in Jones House. Others interested in this topic are welcome to attend.

A native of California, Professor McNeil received his Ph.D. from the University of California, Berkely in 1962. He is married to the former Nobuko Baba of Taiden, Japan.

Appendix B-3

SCHEDULE

Faculty Learning Theory Seminar

PROGRAM

Speaker: David McNeil, Psycholinguistics and Second Language Learning in Children

Wednesday, April 6, 1966

Arrive . . . . 1 p.m.

Meet with Linguistics class . . . . .1:00 - 2:30 p.m.

Faculty Learning Theory Seminar . . . . 3:00 - 5:00 p.m.
JONES HOUSE

Dinner with faculty and students . . . . 6:15 p.m.
EARLHAM HALL

Presentation to Language Department, Faculty Seminar, Education Majors, Others interested; "Second Language Learning"
. . . . 7:30 - 9:00 p.m.
MEETING HOUSE

Thursday, April 7, 1966

Presentation to Learning and Motivation, Psy. 51, and Ed. Psychology, Ed. 50 . . . . 8:00 a.m.
CARPENTER HALL 320

Lunch . . . . Psychology Club . . . . 12:00 noon
EARLHAM HALL

Presentation on work with Bruner to Elementary Majors
. . . . 3:00 - 5:00 p.m.
JONES HOUSE

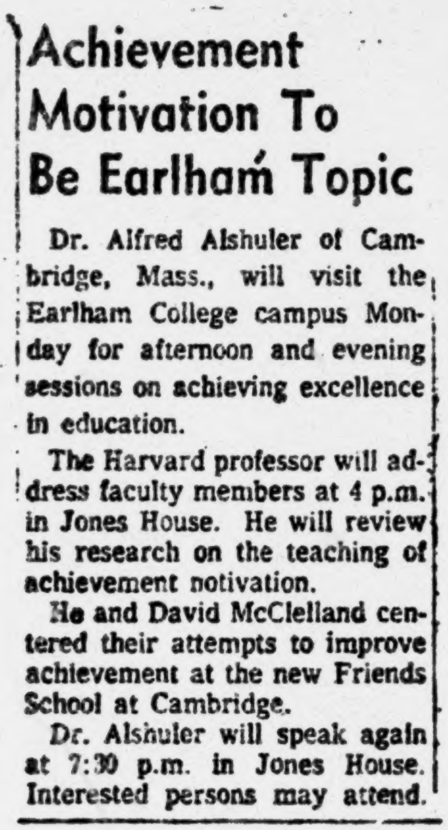
Leave on 6:20 p.m. flight from Dayton to Willow Run

Appendix C

CLIPPING FOR FACULTY LEARNING THEORY SEMINAR SPEAKER

Dr. Alfred Alshuler
from Harvard Univ.
Grad. Schl. of Educ.
Jan. 16, 1967.

The Palladium-Item and Sun-Telegram. Richmond. Ind.. Sunday, Jan. 15, 1967



Achievement Motivation To Be Earlham Topic

Dr. Alfred Alshuler of Cambridge, Mass., will visit the Earlham College campus Monday for afternoon and evening sessions on achieving excellence in education.

The Harvard professor will address faculty members at 4 p.m. in Jones House. He will review his research on the teaching of achievement notivation.

He and David McClelland centered their attempts to improve achievement at the new Friends School at Cambridge.

Dr. Alshuler will speak again at 7:30 p.m. in Jones House. Interested persons may attend.

Appendix D-1

First Progress Report, December, 1965

September 1-3 Travel by coordinator to American Psychological Association Convention to contact speakers. B. J. Underwood, Wm. McKeachie contacted, agreed to come.

September - October Preparation of agenda, recruiting of faculty (10 participating members, 15 associate members). Details following.

November 11 4:00 - 5:30 p.m. Briefing of seminar participants on learning paradigms by R. Johnson, Earlham Psychology Department; and on research in verbal learning by M. Daniel Smith, Project Coordinator. Circulation of dittoed material from writings of B. J. Underwood.

November 15 4:00 - 5:00 p.m. Presentation on Verbal Learning by B. J. Underwood, Northwestern University.

7:00 - 9:00 p.m. Further discussion of implication of research on verbal learning for under-graduate education.

November - December Participating members draft brief reports (one member absent). Reports following participating members. Coordinator contacts additional speaker, Professor D. McNeil, Michigan, Psycholinguist, Ph.D., (Postman, Summer Research, J. Bruner.) Also attempting to locate an expert on concept formation for winter term. (H. Kendler, University of California, Santa Barbara unable to come.)

Faculty Seminar on Learning Theory and the Social Psychology of Education

Participating Members

Gerry Bakker	Assistant Professor of Chemistry B.A., Calvin College, 1955; Ph.D. University of Illinois, 1959.
Lincoln Blake	Assistant Professor of English B.A., 1955, B.S. 1955, Tufts University, M.A. 1961, Ph.D. candidate, University of Chicago
Cam Gifford	Assistant Professor of Biology B.A., Earlham College, 1955; M.A., Harvard, 1959 Ph.D., University of Georgia, 1964
Jerry Godard	Dean of Men, Assistant Professor of Psychology B.S., 1958, Candidate for Ph.D., Columbia Univ.
Fred Grohsmeyer	Professor of Psychology B.A., DePauw University, 1948; M.A., Northwestern University 1949; Ph.D., Purdue University 1954
Chuck Martin	Assistant Professor of Geology B.A., Dartmouth College, 1954; M.S., 1959 Ph.D., 1962, University of Wisconsin
Doug Steeples	Assistant Professor of History B.A., Univ. of Redlands, 1957; M.A., 1958; Ph.D., 1961, Univ. of North Carolina

Associate Members

Jack Bailey	Associate Professor of History B.A., Earlham College, 1950; M.A., Univ. of Wisconsin, 1951; Ph.D., Harvard Univ.
Ed Bastian	Professor of History Ph.D., University of Chicago, 1931; further study, Univ. of Paris and Univ. of Chicago
Barbara Blake	Faculty wife
Frank Darrow	GLCA Teaching Intern in Chemistry B.A., Williams College, 1961; Ph.D., University of Pennsylvania, 1965

Joe Elmore	Academic Dean and Associate Professor of Religion B.A., Southern Methodist, 1949; B.D., Yale Divinity School, 1952; Ph.D., Columbia Univ. 1963
Leigh Gibby	Assistant Professor of English B.A., Univ. of Colorado, 1941; M.A., Univ. of Chicago, 1947; Ph.D.,candidate, Univ. of Chicago
Dick Johnson	Assistant Professor of Psychology B.A., Hamline University, 1958; M.A., 1959; Ph.D. University of Michigan
Hal Hanes	Assistant Professor of Mathematics B.A., Texas Christian Univ., 1957; M.A., Univ. of Kansas, 1959; Ph.D., candidate, Univ. of Kansas
Bill Rogers	Director of Student Counseling and Assistant Professor of Religion and Psychology B.A., Kalamazoo College, 1954; D.B., Chicago Theological Seminary and Univ. of Chicago, 1958; Ph.D., University of Chicago, 1965
Roberta Selleck	Assistant Professor of Political Science B.A., Oberlin College, 1950; M.A., Univ. of Minnesota, 1952; Ph.D., Radcliffe , 1961
Bill Stephenson	Professor of Biology B.A., Knox College, 1950; Ph.D., Univ. of Minnesota, 1955
Stephanie Stilwell	Assistant Dean of Women and Head Resident in Earlham Hall B.A., Pembroke College, 1963; further study Earlham School of Religion
Wilmer Stratton	Associate Professor of Chemistry B.A., Earlham College, 1954; Ph.D., Ohio State University, 1958
Dave Telfair	Professor of Physics B.A., Earlham College, 1966; M.A., Haverford College, 1937; Ph.D., Penn State Univ., 1941
Jim McDowell	Associate Professor of Psychology and Director of Testing B.A., Antioch College, 1939; M.A., 1949; Ph.D., 1951, Ohio State University

J. Godard, Counseling:

I found the abbreviated introductions by Dan Smith and Richard Johnson to basic concepts in learning well organized and well received by other members of the seminar group. It was material that I was quite familiar with, and consequently not particularly instructive for me personally. It was illuminating, however, to have an indication from the other members of the seminar of the general knowledge level regarding learning theory that might be expected from informed faculty not of the social sciences.

Benton Underwood's presentation was very nicely done, for the limited time that he had. Again it was rather basic material as should be expected, and did not seriously influence my own perspective toward teaching and learning. It seemed that there were two primary factors stressed by Underwood which had some relevance to several seminar participants. The first indicated the limited advantage of well organized, brilliant lectures for provision of information to students. Rather their worth must be counted in terms of their motivational stimulation. Secondly the clear advantage of distributed, as opposed to concentrated, curricular experiences has direct relevance for the proposed inter-term period, and perhaps for a 3-3 generally.

C. Gifford, Biology:

I found both the recent seminar and the preparatory session interesting and knowledgeable. The prep session was of special importance in that it presented and renewed various psychological interpretations of learning which in most part were new and in other parts rather dim. I would find it extremely helpful to have, after such a session, a typed sheet which would define the theories and technical terms presented, accompanied by a simple example of each.

The seminar by Dr. Underwood presented various new facts in regard to learning and retention which tended to reinforce some of my own views arrived at through my own learning and teaching experiences. The effect of this reinforcement will result in more confident application in forthcoming courses. In particular, the means of dealing with retention and interference seems quite applicable to certain laboratory courses where the student is required to learn large numbers of new structures and terms. This of course involves paired associates.

In terms of college curriculum, the facts presented by Dr. Underwood might indicate that the trend toward fewer exams, etc., which seems to be foremost in many peoples thinking, may be a moving in the wron direction.

I found Dr. Underwood's lecture knowledgeable but somewhat distressing, in that he talked in such broad generalities. However, in overall evaluation I feel that Dr. Underwood's visit was a valuable experience.

Some Comments On Paired Associates in Geology

C. Martin, Geology:

In certain geology courses, something very similar to paired associates is an important factor. This is particularly so in areas such as paleontology and mineralogy where students must learn to identify fossils and minerals by observing properties and characteristics. The memorization of mineral species and their chemical formulas and of fossils and their geologic age or range is always troublesome for students. Here it appears that part of the problem is what Dr. Underwood would call intra-list similarity - forsterite is $Mg_2(SiO_4)$ but $Fe_2(SiO_4)$ is fayalite and both forsterite and fayalite are varieties of olivine. Presumably this similarity makes learning harder. In addition this is probably a highly interfering situation. The same physical properties or chemical elements are present in many different minerals, the difference being in the combination of these in any single species.

It is clear that there is no way to avoid or eliminate these situations short of not studying minerals or fossils, so our only hope seems to be in easing the student's burden in other ways. Dr. Underwood would probably suggest 1) spending more time learning minerals and fossils, and 2) spread the learning over a longer period of time. The problem is one of having only a single term available for each of these courses. Assuming this to be the length of time available, perhaps the answer lies in some mechanical device which will allow the student to continually review the physical and chemical properties of minerals which presumably he has already learned. A simple matching device which turns off a light if two columns are correctly matched has been used sparingly, although not in either mineralogy or paleontology. Synchronized slide projection and taped narration might also be used as a learning-review device. Either of these devices would allow for frequent review.

This perhaps points out what I have suspected is one of the difficulties of 3-3. We can lecture less and ask that students obtain the rest by independent reading, but it is difficult to compress (in time) what we consider "lab material". A student can read about a mineral in several books, but he doesn't "know" that mineral until he has held it, seen it's luster, felt it's density, tested it for chemical elements, etc. There is considdrable question in my mind whether students can do an adequate job of this lab work for the approximately 20 species per week necessitated by the length of a term.

J. Kennedy, Librarian:

Several of Benton Underwood's ideas have altered or strengthened my views on how to give library instruction to classes with term paper assignments. Until this term most of my presentations to classes have taken only one class period. Now I see that because the time spent on materials is the basic determinant of how much is learned, the annotated bibliographies should be handed out as early in the term as possible. At that time there should be accompanying information on how to choose a term paper topic. These instructions should be written not verbal, because students absorb information faster from writing than from lecturing. Also, reviewing printed material is more effective than reviewing notes from a lecture.

Because the principle of distributed practice is so important to learning, it is important to hand out the annotated bibliography at least one class period before it is discussed in class. The same principle also indicated that two or three weeks after the presentation it would be advisable to give a short quiz about library materials.

As a freshman advisor, I have already stressed to several advisees the importance of distributing their practice (reviewing) as well as spending enough time on studying.

L. Blake, English:

If it is true that the amount of learning is proportional to the time spent learning, then the primary function of the teacher is to motivate and guide the student. Thus:

1. In preparing to teach a course, the teacher is obligated to construct a full bibliography.

2. At the beginning of the course, the teacher should insure that the students are thoroughly familiar with the nature and use of library resources.

3. During the run of the course, the teacher's responsibility is to give directions, answer questions, clarify confusing issues, and especially to stimulate curiosity, thereby motivating the student to work harder and longer.

Such observations, however, relate to the methodology of teaching; they ignore the content of what is taught. Within the content of a course, both methodology and facts claim attention. Which is to be taught? Will knowledge of factual material of a novel reveal the sort of critical questions that can be asked of it? Should one rather teach the critical tools, and let the student use them on particular texts? Whitehead describes a rhythm of education which moves between freedom and discipline, between gathering facts and disciplining them into a systematic order. That the student should gather the facts independently seems axiomatic. That he can discipline these facts into systematic order purely by dogged persistence seems unlikely or, at best, wasteful during the early stages of college study. Early in any particular course, especially during the freshman and sophomore years, it seems that the student should be taught the critical tools in the classroom, while he gathers "facts" independently. Let him learn discipline by imitation, facts by inquiry. During the latter part of the course, let the teacher shift from lecture to dialogue to test the student's grasp of methodology. In upper level courses, if the fundamentals of methodology have been mastered, the student should be freed to pursue independent study. Tutorial sessions and periodic examinations should be provided to spur and test his progress.

F. Grohsmeyer, Psychology:

While Underwood oversimplified some aspects of verbal learning (a matter of time and of level of sophistication of group) there appears to be some very basic implications stemming from his talk. These have to do with his comments concerning motivation, reinforcement and time spent on the material. Following his line of thought to its obvious conclusion leads us to question very seriously the impact of a purely lecture course on a student's learning. Only insofar as the lecture serves to motivate the student to spend more time on his work would it appear to be of value.

As far as the psychology department is concerned, we will give serious thought to reducing lecture time even more particulary in the Intro course, and to increasing considerably the amount of time spent in discussion groups. Possibly, we will attempt the approach of the Air Force (I believe it is) and have student groups meeting on their own for discussion and bringing their questions back to a periodic total class discussion session.

D. Steeples, History:

The session proved extremely interesting and moderately useful. As far as my views on teaching and learning were concerned, the generalizations of the discussant placed within a framework of research findings some personal impressions derived in graduate study largely by trial and error. Of these, the finding that the amount of time expended in study/learning was the most significant variable in degree of learning was the most notable. Also important, however, was the discussant's demonstration that a distribution of the time expended was a significant variable.

It is not clear that my overall approach to teaching will change. However, I am confident that I shall emphasize (even more strongly. at present) to my students the modesty of the instructor's role as a source of information. Too, in counselling students re study techniques it will be possible to comment more intelligently and, hopefully, more helpfully.

No suggestions as to change in format.

J. Bakker, Chemistry:

The visit of Prof. Underwood was a significant visit in a number of ways. The preparatory session prior to his visit was valuable not only in that it made the work of Prof. Underwood more understandable but because it began conversation among the faculty on some of the basic facts of learning theory and showed to all of us some of the resources present already on this campus.

The many times that I have heard Prof. Underwood's ideas quoted since his visit argue for the notion that his visit left a real impression on the faculty. The discussions of the Time Law and of the value of repeated learning attempts have come up time and again in our examination of further curricular change.

However, in one important way I have been bothered by the discussion during Prof. Underwood's visit and since. The extrapolation of conclusions from short experiments of paired-associate learning to the problem of choosing three-three or some other curricular arrangement is completely indefensible and something no respectable scholar should condone and certainly not encourage. Prof. Underwood, however, commented freely and with finality on curricular matters assuring us that his comments were soundly based on his learning research. The conclusions he has drawn from his experiments only point one to the need for doing similar experiments on curricular problems. There are no ready-made conclusions to these larger and much more complex problems.

The one thing which keeps coming back to my mind when I think of Underwood's work is the fact that students in chemistry rarely learn something, either facts or concepts, to any really demanding criterion level. We have built into our courses and the chemistry major's curriculum an emphasis on the complexities of chemical problems and the fact that much is not yet understood. I wonder if we should not be giving students more opportunity to learn some things really well.

Appendix D-2

Second Progress Report
February 25, 1966

December - January -	Location of speaker on concept formation: Lyle E. Bourne, Jr., University of Colorado
January -	Briefing of faculty on concept formation, issuance of several mimeographed discussions of learning theory (written by coordinator of project) culminating in one seminar on "Concept Formation".
January 26 -	Appearance of Lyle E. Bourne, Jr. on campus meeting with the Faculty Learning Theory Participants and Associates.
February -	Participating members turn in brief reports (two members withdraw due to press in their schedules) Scheduling of visits of David McNeil and Wilbert McKeachie, April 6 and May 11 respectively after discussion with Faculty Teaching and Learning Committee.

(Participating members reports following)

F. Grohsmeyer

The material presented by Bourne was quite interesting as was his experimental procedure. However, I found it difficult to relate his conclusions to the classroom setting -- except perhaps for some insight into the organization of material and the order of its presentation.

Part of this is my fault -- I loaned my material to a student and did not get to do my homework. Nevertheless, I wish he would have stuck his neck out a bit and generalized more. I feel a need for interpretation.

On the whole I found Underwood more relevant for me.

D. Steeples, History:

Lyle Bourne's remarks were a well organized (if slow-paced), easily comprehended introduction to experimental studies now taking place in the area of concept learning. His definition of the term "concept" as involving two elements--a class of objects, ideas, or a class of aspects, attributes, or characteristics of a population of objects, ideas, etc., and a rule governing or describing the relationship between same, was to me a useful operational definition.

As for the experiments described, involving the identification of relevant attributes, or learning the rule involved in a particular concept, or identifying the rule governing the population of characteristics in a concept, my own reaction is less enthusiastic. The results seemed fairly obvious in most respects. That is, one would expect it to take longer for subjects to identify attributes or learn rules where the size or/and complexity of the stimulus population increases. On the other hand, it was most interesting to learn that subjects given problems in rule identification, after having learned in some sense the rules that could possibly govern in a given range of concept-problems, solved their problems with an average of less than two errors. I regret very much that Mr. Bourne did not comment at greater length on the significance of the fact that every subject seemed to have adopted a strategy of "collapsing" populations of stimuli into an abbreviated set of categories. Was the adoption of this strategy largely intuitive? And in fact, as he suggested, was a seemingly intuitive resort to such a strategy more efficient than formal instruction in such strategies.

The implications of the findings presented seem quite limited for my own discipline. It is quite conceivable that an adoption of strategies growing out of problem solving activity would have considerable relevance in the teaching or learning of mathematics, the methods of natural science (via the use of laboratory exercises), and possibly even formal logic, but it would appear to me that the number of variables or attributes of a stimulus population in a typical historical problem would probably be so great as to make the formation of a strategy, through problem solving, a formidable task for a student of limited sophistication. I cannot, in any event, readily conceive of a manner in which procedures similar to Mr. Bourne's experimental procedures would readily yield skills or strategies that would significantly facilitate the mastery of a body of historical evidence. If anything, the presentation would make me more suspicious of people advocating such an approach for the study of history than I was prior to encountering the experimental evidence in question.

A few additional comments might be in order. It would appear to me that the experiments described could on the whole tell very little about the means by which subjects form concepts, except in the case of the development of strategies noted. The projects do yield an understanding of the amount of time it takes to master one or another of the tasks described, and the relative difficulty of the various tasks. But experimental results seem to be much less adequate when it comes to explaining HOW (i.e., by what intellectual processes) concept learning occurs, again saving the area of strategy commented on. Had there been more time, it would have been interesting to explore the possibility of manipulating the stimulus population to yield some understanding of intellictual processes. Similarly, it would have been interesting to consider the efficacy of a procedure of asking the subject to verbalize concerning the means by which he classified stimuli or manipulated them to accomplish his task. Finally, although a great many additional questions could be raised, what are the implications of the importance of what seems to be intuition in the formation of strategies for problem solving in the area of concept formation?

In summary, the session was interesting in many respects, and in many others informative and even illuminating. The data presented, however, seem on the surface to have relatively little application in the teaching or learning of my own discipline, at least in any direct sense. And the presentation offered for me a series of problems the discussion of which might have been very rewarding.

C. Martin, Geology

Professor Bourne's talk on concept formation was interesting and suggested application of this to such fields as geology. I find it difficult, however, to make the jump from relatively simple card experiments where the number of relevant attributes is limited to geological concepts which invariably have many relevant attributes. With multiple relevant attributes, it becomes impossible to describe the relationships between them with a single rule. Suppose, for instance, one is trying to form the concept of what granite is. The relevant attributes one might use are:

1) The presence of certain minerals
2) The proportions of these minerals
3) The grain size of these minerals
4) The uniformity of the grain size in the rock
5) The textural relationships between grains

The rules relating these attributes become complex. For instance, the grains must be between 1mm and 3 cm in diameter; all of the grains must fall within this range; quartz, plagioclase, and orthoclase must be present; quartz must make up at least 10% of the rock by volume; orthoclase must constitute at least one-third of the combined volume of orthoclase and plagioclase; the texture must be crystalline. Onee one has mastered these rules relating the relevant attributes he hopefully has the concept of granite.

The question really is how one teaches this to students. Conventionally, one gives students the pertinent rules and relevant attributes and asks them to learn these, usually by examining and classifying specimens of different rock types. One hopes the student learns the rules and develops a concept of granite or gabbro, or whatever the rocks may be. Professor Bourne's discussion of concept learning with cards caused me to wonder if something similar couldn't be done using either actual rock specimens or kodochrome slides in place of the cards. As an example, consider the common rock granite. Perhaps the concept of granite could be broken down so that first a student formed concepts of the various relevant attributes of granite. For instance, a series of specimens could be used to indicate the nature of crystalline texture as opposed to clastic texture, and similarly with mineral composition, proportions, and the other attributes of granite. Thus the student would be in the position to form a concept of granite.

This essentially becomes a situation in which previously mastered concepts become the relevant attributes for the next concepts to be considered. This would seem to be an extremely complex and time consuming situation even for a relatively clear-cut concept such as granite.

Reduction of such a complex concept as mountain building to its relevant attributes is indeed frightening. Still for certain bits of necessary information such as recognition of grain sizes, textures, etc., the techniques of concept formation suggested by Professor Bourne may be useful. Some experimentation in this direction would be interesting.

In a similar way, slides can be used to help students form concepts of various geological landforms, etc. We have done this to some extent with the Graflex machine, but so far, not in a very sophisticated manner. Again, this might be a very useful tool in aiding concept formation, especially if the slides were properly sequenced.

J. Kennedy, Librarian

Concept formation, as presented by Lyle Bourne, might be a helpful approach for teaching students how to use the Library. At any rate, skill in using the Library may be said to require the mastery of a number of concepts.

Some library concepts fit the rather simple paradigm of a rule joining two attributes, as described by Lyle Bourne. For example, most questions regarding the selection of a reference source may be assigned the attributes of a subject and a class of reference books. The question, "What are the best books on learning theory?" leads the answerer to assign "psychology" or "educational psychology" as the subject and "selective bibliography" as the class of reference books. Thus the answerer arrives at his answer: a selective bibliography of psychology. This is the way of thinking which reference librarians learn from library school and on-the-job experience. Hopefully, it can be taught to undergraduates.

For several months Earlham's librarians have prepared bibliographies in connection with library instruction for special classes. These bibliographies have been organized to teach the concept of selecting reference sources. However, we have not tested the students to see if they have learned the concept. This might be done by means of a test which stated the concept and asked the student to identify positive exemplars from a list of positive and negative exemplars.

A major difficulty with applying the concept formation approach to our situation is that the librarians usually meet a class for only one hour. They need to present a variety of information and concepts in a brief time. A second difficulty is that some concepts appear to be either too self-evident or too complex to be taught effectively by means of Lyle Bourne's simple paradigm of a rule joining two attributes. The concept of "see" and "see also" references is self-evident when a student sees them in the subject heading book. The concept of the Library as a vital, complex, interlocking system of bibliographical information which is arranged for problem solving is a concept which is difficult to teach, but important. Perhaps such a complicated and abstract concept could be taught by presenting positive and negative exemplars, but I would need to be shown.

J. Bakker, Chemistry:

It is beginning to become obvious how little we know with any certainty about the learning process. The problem of memorizing the chemical structure (numbers, kinds and arrangement of atoms) of a substance is reduced to the problem of "paired-associate" learning which itself turns out to be very complex. In fact, there always remains the nagging doubt that maybe the reduction to the simpler case was not that at all and instead a more complicated problem was produced. But proceeding from chemical structure to "paired-associates" must surely be accepted as a simplification of the problem and, when this is done, the enormity of the difficulties we would find in studying the learning of chemical structures really becomes apparent.

The relatively simple conceptual relationship between a single electron in an outer set of atomic orbitals, a low ionization potential, and a particular set of chemical properties certainly must be much more complicated than the four rules for relating redness and triangularity. Yet Professor Bourne gave the impression that he would not be ready to work on systems much more complex for some time. Modern research is producing needed answers, but only slowly and for very much simplified systems. Beyond the obvious responses of demanding more research and despairing of having reasonably complete answers in our lifetime, one begins to look for the long extrapolations from present research to our problems with teaching and learning as well as ways to get around the need for a scientific answer through a progmatic approach.

One significant thing which again became clear to me during Bourne's visit was the idea that we must clarify what we hope to teach. Specifically, the concepts we wish our students to learn must be clearly and concisely understood by us teachers or we will certainly have difficulty in teaching them.

In Bourne's work it was assumed that learning sessions would be relatively short, several hours at the most, and learners' responses would be accepted or corrected immediately. Are we being realistic in normal situations by expecting students to study long hours and with little instructor feedback? Can motivation and self-discipline reasonably be expected to carry a student so much farther than a research subject? Normal study conditions would seem to be much less conducive of effecient learning than the conditions employed in the research situation.

The work of Bourne was interesting and his visit significant for the discussions it prompted. He was a worthwhile seminar leader.

L. Blake, English:

The tardiness of this report reflects the difficulty I have had in relating concept formation to the teaching of English at Earlham College. I limit my reflections to Earlham because there is little emphasis here on the study of traditional grammar, the only area in which I feel concept formation might be demonstrably applicable and helpful. In traditional grammar one can identify matters of convention: a noun shall denote the name of a person, place, thing, relationship, etc; a complete sentence shall contain a subject and a predicate and express a complete thought. The statement, "Colorless green ideas sleep furiously" is a perfect grammatical sentence, but it is nonsense. Thus the crucial issue is not the definition of the concept, but its effective use. Concept formation, as a convenient shorthand device for condicting an inquiry into the structure and nature of language, is a valuable tool, but it is not a tool that Earlham is concerned to provide. The English Department assumes the student has already formed the necessary grammatical concepts and is concerned particularly with their application in effective discourse.

Is there any assurance that the student who can identify a metaphor is, or is on the way to becoming, a better student than the one who cannot? Is the mind furnished with a concept, an effective mind? Are such soncerns as perception and discrimination and appreciation, sensitivity to connotations, for instance - matters for concept formation? Can these matters be reduced finally to rightness and wrongness so as to be transmitted as an acknowledged concept. "House" is a concept. It signifies "a building for human beings to live in." So also is home, abode, hut, shack, mansion, pad. The denotations of these terms are roughly analogies. Their connotations are not. Can concept formation, finally determined by rightness or wrongness - decided by the teacher or by convention - capture the reaction of a society matron and a beatnik to "pad"? The response depends upon the personal experience of the respondent. One is then confronted by an infinite number and variety of concepts, thus the seemingly impossible task of identifying and evaluating all human experience. It is better, then, in college teaching to dwell on the definition of some concepts which can be agreed upon - metaphor, for example - or upon the varieties of responses that a metaphor can evoke. It seems not so important that a student identify "Tis the East and Juliet is the Sun" as a metaphor, as that he responds sensibly and sensitively to it.

Lyle Bourne's exposition did not persuade me either that concept formation can or that it might be able to handle this problem of appreciating the varieties of human experience and expression - ultimately the purpose of teaching literature.

Appendix D-3

"A Seminar in Basic Principles of Learning for Faculty Members of a Small Liberal Arts College"

Third Progress Report

July 10, 1966

April 6, 7: Visit of David McNeil, Psycholinguist, to campus to address seminar, also various undergraduate courses and majors in elementary education.

Learning Theory Seminar: 3-5 p.m., April 6
Learning Theory Seminar Discussion: 7:30 p.m., April 6

May 11: Visit of William McKeachie to campus, to address Learning Theory Seminar meeting in conjunction with full faculty seminar, 10 a.m. Discussion with William McKeachie, 3-5 p.m. in Jones House.

May, early June: Discussion of Faculty Learning Theory Seminar by Teaching and Learning Committee of Faculty. Individual discussions with members of the seminar (both participating and associate) by director of seminar.

D. Steeples:

David McNeil's was easily the wittiest, most graceful, and most lucid of the presentations thus far afforded the seminar. He brought into sharp focus many concepts about which I had read formerly, and without much enthusiasm.

The general outlines of the speaker's subject were already familiar to this reporter. Such matters as the semantic component of language, pertaining to meaning; the syntactic component, relating meaning to the sounds of words; and the phonological component, pertaining to the sounds of words; were all approach to grammar which Mr. McNeil developed at some length, showing how practical rules permit a person to expand upon the base structure of a language or indeed a sentence to produce the subtle modulations characteristic of the surface structure of speech/ sentences. However, in this last area, the speaker's comments served effectively to clarify a number of areas only partially understood by this writer prior to the seminar session.

Perhaps the most significant, interesting, and potentially useful aspects of the presentation had to do with experimental findings concerning the way in which children learn a language. That they begin with the base structure of sentences, reduced to simplest form ("Adam run") has long been apparent to discerning parents. But other aspects of the language learning process are not so obvious. For example, the role of "expansion," in which the parent repeats a small child's crude statement (as, "Adam was crying yesterday") and bounces it back to the child was novel to me. It would appear that parental expansion of children's comments represents an essential step in the child's learning how to build from base structure of sentences to surface structure, how to modulate or refine his thought for lucid, direct vocal expression. That perhaps 30% of parent's conversation with small children is in effect expansion, and that virtually all of this expansion is contextually correct (or must be, since children do learn to build from base to surface structure correctly) was notable. But it must be admitted that the implications for these findings as they pertain to learning a second language were perhaps more interesting and significant that their implications for small children. McNeil's suggestion that it might be desirable to experiment with imitating the process by which small children learn a language---beginning with the base structure of sentences in a tongue and, after it had been learned, expanding on statements in order to introduce transformational functions---seemed particularly provocative insofar as it raised the possibility that such an approach might enable students to think in a language from the moment of initial acquaintance with it. In any event, such an approach seemed in many ways more reasonable, potentially, than offering instruction based on mastery of polished sentences (surface structure) and hoping that therfrom some lucky students would be able to intuit back to the base and thus discover how to think in the tongue.

It was also interesting to note that when children imitate adults as, for example, adding modifying words, they ordinarily do so by building on to their own grammatical system or knowledge of the base structure of sentences. Thus "Adam is running fast" translates as "Adam run fast," and new material is built on to the old structural foundation and reinforces it. Similarly, the addition of "ed" to the past tense of weak or regular verbs becomes a general principle that is applied to strong or irregular verbs as well, probably because the application of a single principle to all situations is simpler than mastering irregular forms of several verbs, a task that awaits a good bit of formal instruction even though the strong verbs are much more frequently used in ordinary speech than the weak ones.

McNeil's comments on "tip of the tongue" were interesting, but, I would judge, they hardly deserved the amount of time that they came to occupy.

In sum, the chief utility of McNeil's findings would appear to lie in some possible modification of instructional techniques for second languages, and in imparting a fuller understanding of the nature of verbal learning in general. There appear to be no special applications of the findings in my own discipline of History. I do, however, welcome the opportunity to become more fully acquainted with the research techniques employed in the field of Linguistics, and with Transformational Grammar.

C. Martin:

While I thoroughly enjoyed David McNeil's presentation, I see no application of it to the field of geology. It does seem that his ideas about transformational language learning are reasonable, at least based upon my experience at second language learning. I wish I had been in a course that followed his recommendations.

C. Gifford:

I. Report on Concept Formation by Lyle Bourne.

I found this seminar most informative and interesting. Though I have been aware of concept formation for sometime, I had never taken time to focus clearly on it or relate its significance to various disciplines. I am sure now that my lack of competence in the areas of both math and physics stem from working knowledge of concept formation.

My major concern now is whether concept formation is applicable to the field of biology and whether through its use, various biological concepts would be easier to learn and give the student greater facility in application. To date, I cannot visualize any type of application to biological systems because too many parameters are involved.

II. Report on Transformation Grammar Theory by David McNeil.

Again I found this seminar very interesting and informative. However the subject matter was in no way related or applicable to my particular discipline.

I have always been convinced that the best way to learn a foreign language is by living in that particular foreign country and learning the language by being forced to hear, speak and think in said language. In this type of situation, one apparently learns the language by the transformation from base structure to surface structure. Evidence for this is suggested by the way one acquires his native language.

Though I did not have a chance to discuss this with McNeil, the two learning situations are similar in many respects.

J. Kennedy:

David McNeil reported that until recently the child was regarded by psycholinguists as a small adult with limited knowledge of English grammar and vocabulary. Presently the psycholinguists are finding it much more fruitful to study the child's language as if it were a foreign language, with a different grammar from adult English.

This approach has interesting parallels to the language of subject headings in the card catalog and other reference sources. Although the card catalog uses English words, it is helpful to think of it as a foreign language with a vocabulary and grammar to be learned. Having learned that the card catalog uses "American fiction" as the subject heading for American fiction, a student might expect to find American art under the subject heading "American art". But no, the heading is "Art, American". And why is it "U . S.--History," but "Education--U.S.", instead of "U.S.--Education?" These examples defy logic and show that the language of subject headings is not part of the cultural heritage of every Earlham undergraduate.

When I teach subject headings, it may catch student interest to compare their study of subject headings with the psycholinguists study of the child's language. Neither the child's language nor the language of subject headings is as easy as it appears on the surface.

G. Bakker:

The talks by Professor McNeil were both very interesting and very informative. He is a very capable lecturer and keeps his audience involved as he develops his subject. The study of language structure and the teaching of language is fascinating to me, not only because I am a teacher interested in learning theory but also because I have a 2 1/2 year old daughter learning a language.

It is going to be difficult to apply McNeil's ideas in the field of Chemistry since what he had to say about learning theory was implicit in his talk and not very explicitly discussed. I could infer from listening to him that his ideas about learning theory were quite unorthodox. He seemed to say that the structure of the material to be learned is of great importance to the way in which it is learned. He also seemed to say that the past experience of the learner was very important in terms of providing a framework for the material to be learned. This relationship between the structure of the material to be learned and the past experience of the learner is at a level of sophistication considerably beyond that of the systems studied by Bourne and Underwood. The problems faced by McNeil are much closer to the problems which we as teachers face in our classes and I understood McNeil to say that learning is a very complex set of interactions between learner and material learned. It was heartening to me, after hearing the oversimplifications of Bourne and Underwood. I was very much attracted by the notion that the structure of the material to be learned is of such importance, for the learning of chemical concepts seems to depend very much on our understanding of these concepts and the ways in which we presnet them.

I might speculate and suggest that chemistry is a second language and that the core structure of chemistry should be understood by the teacher and presented simply, and then, by a means of expansion, the surface structure of chemistry should be presented. Who knows but what a model like this might be useful in putting the teaching of chemical concepts in the proper perspective.

I would have liked to have heard more about McNeil's ideas about reinforcement and learning theory, but maybe tantalizing us with reference to unorthodox ideas, is making us do our own thinking and this might even be better.

In any event, I am now listening to the speech of my daughter in a more informed fashion and with heightened interest. As a father who already dotes too much, I now have an excuse for what I love to do anyway.

F. Groshmeyer:

First of all, I found Dr. McNeil a very refreshing lecturer. Aside from that, however, his initial work on common bases in language left me confused. While the work was very interesting, McNeil's basic assumptions and hypotheses in this area were so tenuous that it is difficult at this time to take this aspect of his work very seriously. The sample size (N's of 1-3) the problem of time sampling, etc. do not do much to impress people with his experimental design and procedure.

On the other hand, his work on "tip of the tongue" phenomena was quite interesting and much better done. I was impressed by the ingenuity used in setting up situations and collecting data.

His "second language" speculations were also interesting and well done although there is so much speculation that again one finds it difficult to take this aspect of his work very seriously.

Nevertheless, McNeil is willing to stick his neck out and go ahead with weak methods until something better comes along.

J. Godard:

I must apologize for my late note regarding David McNeil. Because I was out of town I was unable to attend, but did listen to the tapes which I found quite interesting from some of my own research interests, but failed to see a specific relevance for our seminar. Perhaps I missed the obvious, or missed something in not attending the seminar, but I have no specific reaction as to potential relevance for the college classroom teacher.

Regarding MacKeachie, I found him much less interesting because the material he covered was quite basic to a person familiar with learning theory, but I think his relevance for us at Earlham was much more direct. The experimental work regarding different classroom settings was instructive with regard to the effect of different methods of teaching. I think the emphasis on the purpose of teaching is most appropriate here. There must be some specification of purpose before experimentation with a variety of methods. The interpretation of empirical results will differ according to the original rationale. His stress of the motivational factors of skill and particularly rapport seem quite pertinent for our current considerations. And his caution about unstructured curricular emphases early in a student's career is most significant.

D. Steeples:

Please forgive me for incorporating a summary of McKeachie's remarks for my own future reference.

In general, the speaker's presentation reinforced my own random findings in five years of teaching, albeit with scientifically accumulated evidence. It was interesting to note, too, that his report confirmed the observations of the first speaker before the group as far as feedback, discipline, and concentration are concerned.

It was particularly useful to hear of experimental sections in Michigan's Intro. to Psych. Course, taught by three different methods, and to learn of the divergent results. I was not surprised that the recitation-drill sections acquired the largest fund of knowledge, felt more secure and more highly motivated by constant feedback from the instructor in the form of compliments and criticisms and grades on weekly work. Nor was it particularly surprising to hear that students in less highly structured "discussion" sections in which the instructor did not ostentatiously grade, but did try to draw out generalizations from students' experiences and channel discussion along general lines, helping students to criticize each other and think critically, learned less factually but did perform better in the long run in the area of judgment. Finally, it was not surprising that the "tutorial" sections, in which the instructor said nothing save to individuals who approached him for counsel during class sessions showed least progress, discipline, motivation.

It was surprising, however, to learn that the recitation/drill method, whatever its immediate results, produced a greater tendency to take an additional Psych course, but an almost total aversion to majoring in the subject while the discussion technique produced opposite results. And it was surprising to discover that the sexes performed significantly differently under the circumstances noted.

It was further interesting to hear of comparative progress made in sections taught by discussion method, and those in which the students worked more as groups, criticizing one another's remarks, agreeing on assignments, and so on, which again revealed greater capacity to judge on part of the latter. Experimental verification by tape recording student discussions about a movie about a neurotic girl seemed convincing enough---especially insofar as the first group seemed able to label behavior but not to interpret it or react to it from personal experience or in terms of sympathy, while the second became engaged in the girl's problems.

As far as these findings applied to teaching, and a study of the results of teaching, it was not surprising to learn that tests could be devised to measure accumulation of facts, but that tests of a hierarchical nature seeking to measure acquisition of higher skills of understanding, interpretation, manipulation, analysis, and synthesis failed to distinguish between progress in these various areas.

The six "principles" or "factors" relating to teacher effectiveness, which was measured in terms of both student performance and response to a composite questionnaire based on those of Purdue, Minnesota, Michigan, and so on, seemed altogether obvious. Yet it was well to be remindid of these factors:

1) Feedback--reporting to students on their progress, encouraging and criticizing--most reassuring to those needing reassurance and annoying to superior and highly motivated types.

2) Rapport--an ability to listen attentively, sympathetically, helping students seeking their own identity to develop a sense of worth--as a vital motivational factor.

3) General skills--one's "presence" in the classroom, one's whole demeanor---

4) Organization--here, I was a bit surprised, learning that only a moderate degree of organization mattered, while high organization in presentation seemed not to. It was to be expected that a lack of organization, in view of what has already been noted, would yield scant results.

5) The "work factor"--or load to a student's limit. Again, it was of some interest to learn of a difference in response according to sex--that men worked to roughly the same level no matter what the work level, while more docile women stretched themselves. My own experience confirmed that student ratings of teachers were pretty independent of the easiness or difficulty of a particular instructor.

6) Finally, the "teacher himself"--to an educational reactionary it was very good news indeed that what he had suspected all along was probably true, at least for underclassmen in Psych--that different teachers had different "styles," while different types of material and different educational aims (accumulation of facts vs. learning to "think historically", judge, etc.) dictated different "tactics" or "strategies".

In sum, not much learned, but much reaffirmed. And my questions about the validity of so-called "independent study" for underclassmen reawakened.

Appendix D-4

Period covered by report: December 1, 1966 to February 28, 1967

I. Major activities during this reporting period:
Visiting Lecturer-Discussants:

January 27: Dr. Alfred Alshuler, Harvard University, visited campus and spoke to the seminar concerning the conditioning or training of a need to achieve. Dr. Alshuler is a student of David McClelland of Harvard, whose work in this area is recognized internationally. The seminar was well received and participants derived much of potential value for their teaching and for their understanding of the relevance of theory to practice. Comments by participants are found in Section II. It should be noted that attendance at the seminar and at the discussion which was held the following evening was not limited to participants in the seminar.

February 9: Dr. Nevitt Sanford addressed the seminar on the topic of the psychology of adolescence and post-adolescence related to the college student. This address was attended by most of the faculty as well as the participating members themselves. The seminar was held in the afternoon, since Dr. Sanford had to return in the early evening. The afternoon discussion had to be terminated after an hour and a half, to permit Dr. Sanford to make his plans. An interesting and significant aspect of this discussion was the participation of a large number of students in addition to participating and associate members of the seminar: this was particularly interesting since the students were essentially discussing themselves, and thus providing confirmation or contradiction to assertions made by Dr. Sanford. His recommendations concerning curriculum and learning processes stimulated debate and discussion for some time after his departure.

II.

A. On Alshuler.

1. William Stephenson

I found Alshuler's presentations to be both interesting and stimulating. They did not, however, provide a very direct link between theory and classroom practice. I should have profited from a more complete and definitive explanation of how he works with groups to increase their achievement motivation. It was very gratifying to find that his work indicates that achievement motivation can be increased in individuals and groups through careful programming. It would be most profitable if we could attempt to formulate methods by which achievement motivation could be increased in the context of regular courses, seminars and independent study. One way of approaching this would be to develop a brief bibliography or reading list which interested persons might peruse and then to schedule one or two seminar discussion sessions in which we might attempt to formulate an outline for the application of these techniques to our own classroom stiuation. I sincerely hope we do not drop this topic or approach and would like to see it referred to the Teaching and Learning Committee for general faculty discussion along the lines I have indicated above.

2. Robert Brewster

Positive effects:

1. Good outline of achievement motivation: This participant had heard for the first time of certain components and characteristics of good achievers: a) the good achiever anticipates success and failure, b) takes moderate risks.

2. The mimeographed outline on the differences between the achieving, authoritarian, and laissez faire conditions was helpful: This participant realized the authoritarian condition in some of his recitation classes in language. Also, in upperclass tutorials or independent study, sometimes in small colleges the tutor or instructor follows too much the laissez faire condition rather than the achieving condition.

Negative effects:

1. Shaping the individual for increased achievement, according to the McClelland method, may lead to the atrophy of other important aspects of personality, such as co-operation, mutual problem-solving. The end-result might be an over-achiever, driven by the success motive.

3. James Kennedy

Alshuler's presentation on achievement motivation suggests several ways for improving the teaching of library resources.

Since students with high achievement motivation are known to ask help from experts, it is important when lecturing to classes to encourage students to bring their questions to the Reference Desk. An hour or two of library instruction does not make a student his own expert, but it does enable him to proceed independently. Such independence is one of the characteristics of students with high achievement motivation. A reference librarian can both encourage independence and be supportive when students are blocked.

Students with high achievement motivation thrive on moderate risk situations. Therefore it is important in lecturing to classes to suggest that asking questions at the Reference Desk is a moderate risk. Generally, the Reference Librarian is able to direct the student to the information he needs, but sometimes the Library does not own the needed material and is not able to buy or borrow it before the student's deadline.

Goal setting is one of the ways to arouse achievement motivation. It may be helpful to suggest to faculty and students that the acheivement of a term paper is a matter of three distinct goals, not just one goal. The first goal is the working bibliography; the second is the reading and note taking; the third is the actual writing. Jack Bailey and Helen Lees ask their students to submit their bibliographies and reading notes at reasonable intervals before the final paper is due. Such a procedure encourages the student with high achievement motivation to set his own goals for papers in other courses, so that he does not crowd the literature search, note taking, and writing into the last few hectic days. This procedure may provide one solution to the academic pressure felt by some students. It also allows faculty to suggest relevant reading before it is too late.

4. Douglas Steeples

The total impact of the presentation can be summed up in the phrase "verifying the obvious" or commonly known. It was most useful to hear a systematic presentation concerning the methods by which the motivation to achieve may be aroused in students of various ages. However, reflection suggests quite clearly that the methods outlined were merely an application of common sense and of common knowledge about the make-up of the human psyche to a particular problem.

It was interesting and of some value to encounter such a systematic presentation, particularly as it divided processes of arousing achievement motivation into some four areas. First, the area of goal setting, in which an effort is made to encourage the subject to set goals. Similarly, the characteristics and patterns involved in the establishment of a need for achievement syndrome emphasizing thought and action and reinforcement of everyday life made sense. Further, the use of cognitive supports such as, reasoning, relating the new goals to the self-image of the subject and cultural values as they reinforced the process seemed both sensible and appropriate. Finally, the material presented concerning group supports, including the establishment of a group to reinforce the values being inculcated, the importance of warmth and personal relationships, etc., were at once obvious and at the same time understandable.

My own particular concern, of course, lies with the possibilities of applying the findings of Dr. Alshuler in a teaching situation to inspire students to strive for higher achievement. It was in this connection that I found little that I was not already doing that seemed practicable. To be sure an attitude of warmth and openness, and the weighing of a grading pattern so as to encourage efforts to improve have been employed widely in the academic situation already, Some of the other techniques may not be so clearly applicable. For example, where student load is high for each teacher it does not seem that the proposal that students determine when their assignments are due would result in any realistic division of the work load of the professor over a period of time. In sum it would appear that the chief value of the presentation was to reinforce efforts already under way--efforts at which Faculty had arrived at by a trial and error process and which were being undertaken to encourage students to strive more seriously and set their sights higher. It was, of course, useful to encounter some material that centered on the student rather than the teacher and it is to be hoped that future presentations will be more revealing than this one, useful as it was proved to be.

5. William Fishback

These comments are based on the assumption that achievement motivation is not a great problem in mathematics courses at the senior or junior level in view of the elective nature of the courses. All students in such courses tend to be there because they have made a strong commitment to mathematics as a major with a strong desire to succeed, or as a major in a mathematically oriented discipline with a clearly perceived understanding of the importance of mastery of the material. The same remarks, of course, hold true of students in their first two years with a strong commitment to study in mathematics, the physical sciences, or engineering. The problem of creating a desire to acheive is greatest among the "captive audience" of students in the biological and social sciences and in elementary education who frequently fail to perceive the pertinence of mathematics to their own interests and hence make little effort to do more than "slide by".

Motivation can certainly be increased to the extent that course content can be related to the real concerns of the student. This is fairly easy in the case of the elementary teacher group, where the material is easily related to future classroom uses of the students and where the students are homogeneous in terms of their interests and often their abilities. It is not so easy with the other groups mentioned above. This is in part the fault of the narrowness of the training of the math teacher, the lack of homogeneity of the group, and lack of suitable texts. The needs of the teacher to broaden his own perspective and to be constantly committed to curriculum change and improvement are obvious here.

To the writer the most obvious way to "reach" this group is involved with the teacher's attitude toward his students (not the subject matter!). There must be warmth and willingness to meet the student on his own level without any airs of superiority or signs of hostility. The student-teacher relation must be one of cooperation, not competition. This may sound trite, but it is the heart of the matter. An unhealthy relation will inevitably breed dislike and contempt, first for the teacher, but this contempt will spill over into the subject matter and erase interest and any desire to do well. The speaker made the point that goals must be challenging but not hopeless; a hostile situation may make the goals seem to be hopeless when they are not. The word may even spread beyond the class to the point where a whole campus can develop negative attitudes toward a subject and apply these attitudes universally even if a small minority of the teachers in the department are guilty. There can be no group feeling of special status, claimed by the speaker to increase achievement motivation, in such a situation. The writer feels that there are negative attitudes toward the mathematics department at Earlham but that the goals the department sets in its courses are realistic for the students in them. He feels that the difficulty is the result of human relations failings among a small minority in the department and that this situation is going to improve when those failings are no longer present.

Finally, two specific remarks are in order about suggestions of the speaker.

The first was concerned with the value of quick feedback to help achievement motivation. The writer agrees completely and has always tried whenever possible to have any written work corrected and returned by the next class period. This not only gives the students the needed quick feedback, but also gives the teacher a chance to capitalize on a good teaching situation where student interest and concern over the subject matter is high. It would seem to follow also that frequent feedback is in order. The writer suspects he has not done as well as he should on this count and that more frequent submission of written work would help even if this uses some valuable classroom time and increases his own paperwork time outside of class.

The second is concerned with the statement that trend grading rather than mechanical averaging of all recorded grades helps in motivating for achievement. The writer has seen this applied effectively in English composition courses where the final grade reflected the quality level of the student's writing at the end of the course, not the average over the entire course. There is much to be said for such a program. Not only does it motivate the student, but it also may be a more realistic evaluation of the impact of the course on the student. It does place an added responsibility on the teacher of mathematics as a test constructor. He must be sure that his tests are a measure of achievement in all work to date in the course, not just the material covered since the last test. This would not be easy, but the effort is probably worthwhile. The writer is giving it serious consideration.

6. Jane Miller

The Achievement Motive

The McClelland hypothesis proposes that all human behavior is motivated and postulates cultural and economic progress as a result of the presence in the society of achievement motivated men. The theory may, it seems to me, be criticized on three counts: first, although McClelland does not offer the theory as a single-factor explanation for economic progress, he uses the concept in a telodynamic formulation which seems difficult to use in observation of hypothesized antecedent-consequent relationships. The literature is heavily loaded with hierarchies and definitions of drives, motives, needs, and the like which describe the activity they are designed to explain. This leads to the second criticism: doubtless because of the telic concept, the research approach, particularly to historical and anthropological variables may be open to question. Thirdly, the available research fails to support the theory in relation to women in the society which imposes serious limitations on the applicability of the theory.

Even though the experimental evidence is indirect, the accumulation of studies and ingenious design of the research is persuasive in relation to men, and its applicability to culturally deprived or socially deviant boys seems promising. Particularly appealing to me is the stated goal of an inclusive sociocultural hypothesis which holds for all countries present and past. Even should the theory fail to hold up in future research, the insistance on broad points of reference is a healthy sign in the theoretical approach to human behavior. I am also favorably impressed by the attempt both to link human behavior to broad cultural areas, and to apply it in present situations.

Practical Applications of the Theory

As presented by Dr. Alshuler, the achievement motivation framework can be used as a function of personality change. My own impression was that as a treatment rationale, it offers benefits similar to those to be found in a combination of group and behavior therapy. It offers the distinct advantage of simultaneous appeal to power motives and the need for affiliation commonly seen in boys who have failed to internalize culturally appropriate methods of behavior. The school climate game, use of specialized vocabulary, goal setting and general action approach provides a group setting of interest for students which may facilitate the success of the program. It should be noted that stimulus saturation, suggestion, interaction with an emotionally supportive leader, cognitive support and group dynamics all contribute benefits to the conditioned learning aspect of the training program. As a flavorful and successful learning program, it has distinct appeal. It seems to me that its use as a treatment rationale is excellent and carries the advantage of fairly rapid results in changes of behavior. Like many treatment programs for children, however, it must be remembered that it is not so much what is done, but that something is done that effects these changes.

Implications for College Teaching

Classroom structure for the "achieving" classroom may be compared favorably to the "democratic" designation found in the classic Lippitt and White research into classroom atmosphere. Many of the same principles are used to advantage with the addition of the achievement motivation focus.

The emphasis on individual responsibility within structural limits is most interesting to me, and seems a productive concept for college instructors. Many of us tend to authoritarianism or to "spoon feeding" because we perceive the student as one who requires restriction and supervision. Individual responsibility has long been one of my goals in teaching. I feel that it is not common because students are often upset when I present what they perceive to be less structure in class assignments, or expect me to abstract textbooks saving them the intellectual responsibility of making cognitive connections on their own.

Insights into my own personality and my training in counseling and psychotherapy have shown that the "warmth and support" advocated by Dr. Alshuler are beneficial and helpful to students providing the instructor does not permit himself to take responsibility for the learning task. Social reward found in approval and encouragement and broad structural limits provide an atmosphere of initiative in which students seem to me to be motivated to learn, or to seek new information on their own. This method also allows students to receive college required "credits" for pursuit of an individually selected, internally valid intellectual goals.

Immediate feedback in terms of approval as well as on papers or examinations has been demonstrated in many studies as an aid to learning and motivation. Behavioral change as a result of feedback depends strongly on the length of time between performance and the positive or negative reward of grade and professorial comment. I was reminded of this principle by Dr. Alshuler, and have required myself to return all papers, exams and reports promptly at the Monday meeting of classes. This often imposes a heavy load on the weekend, but seems to be working very well in terms of student interest in weekly elective readings and in getting papers in on time.

Dr. Alshuler discussed examinations in response to a question from the group. This incidental discussion of a problem of central importance for us all gave me an idea which I have institutued this term in Social Psychology class. The class has been divided into four groups of nine people to design and administer one hour quizzes. The activity has met with considerable success in that students are participating and meeting a new challenge enthusiastically, and are stimulated to create examinations which have internal validity in terms of course work. They are beginning to empathize with instructors in the difficulty of this process and the gains in class participation are particularly apparent. Since the course involves group interaction this is an added area in which to study and/or observe dynamics, and can be related to concepts of evaluation in class, as well as the evaluative nature of social interaction.

B. On Sanford

1. William Stephenson

Nevitt Sanford's comments to the faculty and to the Learning Theory Seminar were most provocative and informative. He gave insights into the background and attitudes of the current college generation with which I have been unfamiliar. Hence, he helped tremendously to facilitate my understanding of the motivations and attitudes of students. In communicating a "feel" for the contemporary college student and his milieu, he was excellent. I found him increasingly fuzzy over the two day period, however, in dealing with and interpreting hard scientific data. Hence, I feel his visit was very valuable insofar as he acted as a provocator and that the encounters with him were extremely profitable. I would not, however, recommend a follow up with Sanford or with a similar type of presentation. I think we should now be ready to deal with more detailed data regarding the student population.

One thing that Sanford reiterated seems clear: that yesterday's teaching methods and curricula will not serve today's students; and further that today's pedagogy will not serve tomorrow's students. The gap between teaching and learning must be closed if our efforts in education are to be rewarded with reasonable success. Now the question that we, as teachers, must deal with more effectively is how to close this gap and how to divide the curriculum to keep the gap closed in the future. Could we at some time address the attention of the seminar or of the Teaching and Learning Committee to this question?

2. Robert Brewster

Positive effects:

1. Extremely strong projection of a convinced educator in his method of education: This participant was strongly moved by Sanford's presentation to the faculty of his point of view of education at the college level, in a) the idea that the instructor should teach with the individual student's change in mind, or education for values, b) that the explosion of knowledge need not be the drive-wheel to which we attach our educational process, c) that the instructor make clear what his values are, and why he has a consuming interest in teaching the course, or why he has made his field his career.

Negative effects:

1. In a smaller, afternoon discussion, some questions were left unanswered: a) the idea that an undergraduate education can take from three to six or seven years, with periods of other activity, in which the student finds himself, did not meet some arguments, b) the idealisation of the general culture (St. Johns College, Maryland) education, did not fully meet the argument of some training in the natural sciences in this technological age.

3. William Fishback

While the writer would agree with much that Nevitt Sanford has to say about higher education, he does feel that little of it applies directly to mathematics and that much of it seem directed toward the problems of a relatively small minority of college students.

Sanford addressed himself primarily to the problems of those students who are well trained and much concerned with their education. There can be no doubt that the traditional college program does fail to meet their needs; more permissiveness in choice of courses, in the use of independent study programs, and in the creation of special seminars and courses on topics chosen by the students would certainly fill their needs better and would still be good education if properly monitored by capable faculty members. Unfortunately this group is a minority. On any campus there is a large apathetic majority lacking the drive to initiate programs or independent study projects. Most of this group go through the motions of whatever curriculum is provided them, but obtain at most a superficial long range benefit from their studies and certainly do not obtain fair value from a liberal arts education. In addition, those students with well conceived professional goals, particularly science majors, pour all their energies into their preprofessional courses and frequently fail to obtain a true broad liberal arts background, regardless of the courses taken and requirements imposed by the college. What is needed is a broad range of types of programs to meet the needs of the various groups present on a campus. The special programs needed to satisfy the disaffected minority must be provided. In addition, something must be tried to make the liberal arts program more meaningful for the majority. Certainly we can do much better than we do now, but any change for this group is certainly going to have to have more direction and "push" from the faculty than is the type of program appropriate for the disaffected. Small classes, more use of discussion - well led, and good teachers willing to try a large variety of approaches to draw out and create interest in the students are obvious ways to improve the situation.

Sanford made the point that the general liberal arts studies should proceed hand in hand with training. Many of his audience were probably too ready to discount this statement. His remark on the value of paper writing was particularly pertinent in view of the present discussion of academic pressure on this campus. There can be no doubt that the primary purpose of mathematics instruction is training rather than general education. Almost all students who study the subject do so because mathematical competence and certain skills are needed by them in studies in other areas or because they have made a professional commitment to mathematics. Certainly the primary purpose of the department should be the development of these skills. This does not mean that there are not general education values in the subject. There clearly are, and it is an important duty of the mathematics instructor - one which is too often slighted - to emphasize the cultural and historical aspects of the material being studied and to try to point out the effect the subject has had on human society. Some would argue for the offering of mathematics as a liberal study.

Texts are available, and many larger schools do offer such courses. Since many students do study math for training purposes and since manpower and budget limitations are present in the department, the writer would not advocate such a course at Earlham. Students who might choose to elect such a course would probably profit more from a general education course in physical science, in which mathematical considerations should be present.

One final comment. Sanford argues for delay in choice of major and specialization. There is a very small minority of extremely gifted students who are going to make the key contributions of their generation in mathematics and science. They should be allowed to proceed in their field just as rapidly as possible, for math and science research is very much a young man's game. Their programs should certainly provide for liberal studies, but never at the expense of their professional advancement. This group is very small, and if and when Earlham finds one, they should probably urge him to transfer to a large university at the end of two years.

III. Dissemination: None.

IV. Capital equipment: None.

V. Staff summary:
M. Daniel Smith, Project Director, (one-tenth time).
Nancy Carter, Secretary (six hours per week).

Project Director

Date

A Comment on Dr. Alfred Alshuler's Talk on Achievement Motivation.

My overall evaluation is that although he was a most interesting and attractive person, his presentation was insufficiently well organized so that his argument suffered.

It seems to me that what he was saying essentially is that the high achiever is a well-motivated, reality-oriented person. He is more effective in achieving his goals because he has a clearer perception of these, the goals tend to be realistic, self-expectations tend to be realistic, his handling of obstacles seems to be rational and realistic; and he uses feedback to increase his effectiveness. In this sense the theory is by no means new. The finding which does seem new and which gives some reality and heuristic value to the concept of achievement has to do with risk, i.e., the person with high achievement motivation seeks neither the sure thing nor the high risk alternative; but those with moderate risks.

It seems a serious weakness that hypotheses have not been developed and tested for women. Why would not women, who meet the criteria, get the same results on the tests? Have women been tested in no society? What would be done with Helena Rubenstein? Rather than emphasizing father and mother roles in relation to child-rearing, why not emphasize opportunities for exercising initiative in setting and striving for goals in a fairly secure atmosphere? Why wouldn't women's results be the same as those of men? Might the post-war pattern in Turkey and Germany be interpreted in terms of absent fathers in a previously strong patriarchal family? What would absence of fathers mean in the U.S.? Are suburban children high in achievement motivation?--or do mothers restrict their initiative?

Some aspects almost tautological or at least self-evident: People with a strong need for excellence and a good reality orientation tend to be productive--i.e. achieve the realistic goals which they set for themselves. External rewards such as money do not seem to affect them much.

Again, perhaps the contribution is in systematically organizing these ideas and proving that it is possible to help people sharpen, define and emphasize motivations.

William J. Cousins

D. Steeples:

Of the occasions at which Mr. Sanford spoke, his Convocation address proved the most fruitful. Here he based his remarks on research and his generalizations were concise, to the point, and reasonably well supported. His descriptions of the student activists emerging at modern American colleges and universities was perhaps the most provocative and interesting of the material covered. I particularly appreciated receiving confirmation that the student activists were generally more intellectual, more able, and socially more mature than the nonactivist groups.

On the other hand, I found very little in Mr. Sanford's remarks that would prove useful in my teaching that I had not already discovered as a result of personal experience. That one must be concerned for the growth of students, adapt tasks to clearly defined ends, provide ample feedback, and reduce the artificial structures that sometimes impede learning are all truisms, which have lost their gloss as a result of frequent repetition. Furthermore, I reacted with suspicion when it became apparent that Mr. Sanford had an infuriating habit of seeming to agree with every point raised by anyone with whom he was conversing. My distress increased when he agreed that emphasis on content and courses taught at college was frequently the result of nothing more than imperialistic tendencies on the part of faculty, thereby disregarding what seem to me to be a point of fundamental importance; namely, that many faculty are entirely caught up in the excitement and challenge of their disciplines and would find the life of teaching itself drained away, but for this excitement. In a word, there can be no teaching without content. Sanford agreed to this second point, as well later on, apparently unaware of the fact that he had contradicted himself.

My sum reaction then to Mr. Sanford's visit was very mixed, but rather tends toward disappointment. Very little was learned, and at the same time, a fair amount of time was lost. It is to be hoped that future speakers in the area of learning theory will have more to say and that indeed they will be able to get beyond the realm of the obvious in attempting to describe the theoretical framework within which learning might be studied and from the study of which, teachers might learn more about the task of teaching.

Appendix D-5

TECHNICAL PROGRESS REPORT

I. Major activities during this reporting period:
Visiting Lecturer-Discussants:

March 6: Dr. Richard Mann, University of Michigan, visited campus and spoke to the seminar concerning the research he had conducted on college teaching as director of the graduate assistant teaching program of the department of psychology at the University of Michigan. Dr. Mann was invited at the suggestion of Dr. Wilbert McKeachie whose presentation to the faculty last year was so interesting and stimulating. Dr. Mann's presentation proved even more so: the faculty members who heard him were so impressed by his knowledge of teaching and its applicability to their own situation that they pressed him with questions following his talk and in the discussion period which took place in the evening. Furthermore, they urged the director of the seminar to circulate copies of his teacher evaluation questionnaire for use. As a result of this urging, the director has adapted this questionnaire for general use, circulated the modified version for criticism by several members of the faculty, and subsequently had copies mimeographed for use by more than ten faculty members. We have computed our own means for the various categories and factors involved, and are making it possible for our faculty members to compare their scores against means developed on the Earlham Campus as well as against means derived from use at the University of Michigan. All in all this presentation was the most successful and promises to have the most obvious and extensive effects on our faculty of all those so far.

April 17: Dr. Frank Williams of Macalester College visited campus and spoke to the seminar concerning research in creativity. While this was a potentially interesting topic, local schedule conflicts interfered and there was not a good attendance at the presentation or the discussion in the evening. Dr. Williams' interest in the elementary and early secondary level made this of particular interest to those of the faculty who were primarily concerned with these levels (education, psychology).

A. On Richard Mann:
   1. William Stephenson
      Richard Mann's presentation to the Faculty

Learning Theory Seminar and the attendant discussions were among the most interesting and valuable this year. This is particularly true because of the relevance of Dr. Mann's material to the classroom teaching situation. The topology for the teachers which he discussed should have immediate application in student evaluation of regular teaching performance. The implications of the evaluative instruments he discussed, however, go far beyond immediate application. For example, I wonder whether we could not develop a similar instrument that could be used to diagnose a student's needs at the beginning of his educational experience and intermittently throughout his (4) years of undergraduate work. An advisor or tutor could then plan the student's work to meet the areas of his greatest needs and underdevelopment. Similar instruments might be used to assess total course impact rather than just the function of the instructor.

It seems to me that what we need if we are to use materials presented and discussed in sessions like these most effectively is released time to work out new instructional modes in considerable detail. It would be fascinating, for example, to work out a single course in which diagnosis and carefully individualized instruction can be realized and practiced. At least personally I find that I am spending increasing quantities of my time talking about administration and education and less of my time in actual classroom teaching and in the preparation of instructional material. Somehow the academic world is being turned upside down.

Mann's visit, was in any event, a very successful venture.

2. Doug Steeples

Dr. Mann's presentation was one of the most helpful of the two years of the seminar. His attempt to analyze teacher effectiveness in terms of the several roles a teacher plays, and the responses those roles elicit from different types of students, while in part familiar, was most interesting. His suggestion that the evaluation of teacher performance might be made more meaningful if questionnaires were designed to get at performance in specific roles, was provocative. So, too, was Dick Wood's comment that such a questionnaire also might reveal much about the typology of the student population, with all that entails for teaching.

I found the typology of teacher roles especially illuminating. It was interesting to learn that the teacher as an expert---a sharer of information, technique, bibliographic resources, etc.---could be especially effective in mobilizing the energy of students with a strong need to achieve intellectually, and that a demonstration of expertise was crucial in nearly every teaching situation to establish a relationship involving respect and trust. As to the teacher's role as a formal authority, it was useful to learn that acting in this capacity could mobilize students who feel dependent and need structure, design, and assurance that an instructor cares enough about a subject, course, or student to invest in an obvious way time in preparation. Continuing, the function of the teacher as a socializing agent or missionary who mobilizes the energy of students seeking to understand the life styles and commitments of people with special professional interest, was effectively discussed. Again, it was well to be reminded that the role of the teacher as facilitator was important in terms of mobilizing the energy of especially creative students who require encouragement, stimulation without confining structure,and perhaps even something of a therapeutic situation, was only one of several roles that must be played out simultaneously if the entire student population of a given class is to be reached. The role of ego ideal is, of course, familiar to all---that is, the role of a performer whose intense commitment to material and whose ability to make it come to life somehow captures the imagination of students. The image of the dynamo with wires transmitting energy to a room full of students was an apt one. And it was well, in an academic setting which often mindlessly condemns the element of performance in teaching, to hear it repeated that this particular teacher role has tremendous and legitimate capacity to stimulate student energy. Finally, Dr. Mann's comments about the person role were a useful corrective to some common misimpressions. For he emphasized that this role was to be played out in terms of becoming a friend in the service of something--i.e., teaching while relating as a person, while such deeper personal contact could in a more profound way liberate the energy of a student susceptible to encouragement, stimulation, etc., through more intimate contact. What struck me was the importance of balancing these roles, of performing all of them, lest some students with some needs be left out, and particularly the importance of establishing at least a preliminary impression of expertise and authority (as one with the power to grade, structure, etc.) which might then permit fuller interplay of individuals in terms of the other roles in an atmospehere of respect and encouragement. Mann was quite correct in asserting that the roles are all interrelated, and that to fail to see as much is to risk failure by making it impossible, or nearly so, to reach important sectors of the student population.

3. James Kennedy

Richard Mann discussed teacher effectiveness in terms of a sixfold topology, six roles which the teacher plays. He suggested that a teacher might be helped by looking at his teaching in relation to the six roles. This will be the purpose of my report.

The role of expert is perhaps my primary role, when a professor invites me to lecture for an hour on the library's bibliographical resources for his subject. But as more classes receive library instruction, students listen to some of the same information more than once. They may not bother to attend the third or fourth presentation. Of course, this weakens my role as an expert in the students' eyes. The solution to this problem may be to allow students to cut the classroom presentation if they feel adequately acquainted with the sources on the annotated bibliography handed out in advance.

The role of expert is strengthened when I encourage students to bring their questions to the Reference Desk. The faculty often stress this point when they introduce me to the class or make their concluding remarks.

The role of facilitator is crucial to my presentation on how to use the library effectively. The annotated bibliographies, which often include relevant subject headings in the card catalog and relevant pages in particular reference books, are aimed at making it easier for students to find the information they need for term papers. The classroom presentation facilitates the use of the bibliography by demonstrating its use in connection with a sample term paper topic. Transparencies of pages from the various reference sources allow for concrete examples and facilitate the learning process.

A further facilitating step, which has been tried in only two classes, is to ask students to submit term paper topics in advance. Then I provide each student with a tailor-made list of reference sources, including relevant subject headings in the card catalog.

Perhaps the main hindrance to facilitating the students' library use is the occasional professor who asks his students to find information on a topic by "digging around in the library," but does not suggest what tools to dig with. Hopefully, the Reference Librarian will spot these students and offer help before frustration leads to despair. My role as a formal authority is contingent on the professor. If library instruction helps student to prepare better term papers, the professors will give better grades. This fact is usually motivation enough. Sometimes faculty have tested students on their grasp of bibliographic resources, and this has strengthened my role as a formal authority. This role could be further strengthened by my offering library knowledge questions for professors to include on their examinations.

My role as an ego ideal is realized when students watch me doing reference work by working through a sample literature search in class. This role is unrealized when the transparencies of sample pages do not work together to demonstrate a literature search. I have heard that my "performance" would be improved with more examples, more emphasis on the important sources, and less monotone.

My socializing role is minimal, because I do not have students for even one full course. However, six of last year's graduating class had a good enough experience in this library (as well as others) that they decided to become librarians. The library careers displays and Evan Farber's invitations to students to discuss library careers no doubt had their influence also.

My role as person is minimal.for the same reason that my socializing role is minimal. The few students who get to know me as a total person are the student assistants in the Reference Department and the students considering library careers who talk with me at some length.

This report has emphasized my role as a guest lecturer. Another report could be written stressing my role as a teacher for individual students who ask reference questions. It is important for me to remember that reference questions provide an opportunity to teach students how to use the library. It is not enough merely to answer their questions.

4. Jane Miller

This was an excellent presentation; interesting research clearly presented in an entertaining informal approach.

As a conceptual model for the analysis of teaching and learning, Mann's approach seems more fruitful than any I have seen. It is particularly useful in that it is directed toward college level teaching which is often dictinctly different from the teaching role in earlier education. Feedback that is not only objective in nature but which allows a fragmenting or factoring of the role teachers play provides a comparative framework for both objective and subjective alteration of behavior on the part of the teacher. The stimulus value instructors have in the classroom can easily be divided into these dimensions.

It seems to me that the six vectors proposed by Mann offer three advantages to the college instructor:

1. Objective analysis of performance as perceived by students.

The subject of "good" and "bad" teachers is a matter of continuing dialogue among teachers as well as students. So much of the verbal feedback teachers receive is highly complementary in nature due to the power of the eternal grade. Teachers may be so overwhelmed with the flattery of those students who compliment for the sake of "apple polish", that they fail to perceive any need to change or grow in function. Those students who have valid criticisms or suggestions to offer, or those who are either satisfied or uninvolved may keep silent through disinterest or good politics.

The usual feedback questionnaire such as the one used at Earlham, or those constructed by teachers, may be perceived by students and teachers as a kind of "popularity contest" which helps no one, has no normative value and finally, does not offer a framework for definite change in behavior on the part of the teacher.

2. Subjective nature of the vectors.

Division of teacher behaviors into these several areas and definition of essentially subjective interpretations enables the teacher to internalize the structure of the role he plays in a cognitively better organized fashion. He is forced to consider the several aspects of the role as a balanced operation and may substitute for one aspect or another with course structure, library assignments and the like which serve to function in the progress of learning in the stead of that aspect of the role he is unable or unwilling to assume.

This offers an excellent opportunity for the teacher to gain satisfaction. All of us are talking certainly about the same thing: improvement or excellence in function professionially which provides the student the finest opportunity to learn. If the teacher has positive feedback which analyses his role to its improvement, he will then be able not only to do a "better" job, qualitatively, but will more readily be willing to change those aspects perceived as inadequate by his students.

3. Self diagnostic aspect of the vectors.

In motivational terms, the "test-observation-test" nature of the approach is its greatest contribution in my view. The feedback in terms of equilibration of the typology allows the teacher to test his approach in terms of individual acts, or roles which, with successive use of the questionnaire, directs his efforts always in the direction of improvement in function.

With a self-diagnostic profile, the teacher is enabled to relate his activities to a subjective personal framework leading to changes in attitude and mood which in turn alter strategies of teaching and thus the outcome both of his performance and the student's learning.

I was interested in the comment by Mann that the sum of energy released in the classroom determines the direction in which the college will go. This is an arresting thought in an organismic sense. It seems to me that much of the campus unrest across the country today may be interpreted as mis-directed energy which should find an outlet in classroom and studies, but is for one reason or another contained or frustrated in the student population. That the old order and the respected standards of academic tradition are changing seems evident. It remains for those of us who are professionally committed to teaching to improve our methods and our roles to challenge students to direct energies in positive directions by alterations of teaching strategies and by channelization of released energy toward growth and change in the nature of the college itself.

The vector which Mann defines as "formal authority" is one against which students often seem to rebel. I have been disturbed that in our desire to change and improve, teachers seem to be tending in the direction of "socializing agents", "facilitators" or"ego ideals" to the downgrading of authority as a potential sourse of energy which we cannot afford to ignore or throw out. Surely there are teachers who overemphasize this aspect of teaching, and I sympathize with the rebellious student in this case, but it also seems evident that the student does not always know the direction in which he should go, and a formal authority is needed to guide him. Students at college age are often still rebelling against authority, and need an authority figure against whom to rebel. This, then, is one of the aspect of the teaching role which should balance with the other five vectors rather than be discarded as many of us seem prone to do. At the very least the teacher should communicate to the student an amount of care or concern that learning takes place, and reflect his awareness that his responsibility in teaching involves a hierarchy of authority in which he must exercise a decision making function when the need arises. Effective teaching involves responsibility as well as inspriation, just as does effective learning.

5. William Fishback

I feel that Richard Mann's typology and presentation has been by far the most worthwhile of the presentations thus far this year in the learning theory seminar and wish that far more of the faculty had taken the opportunity to hear him. I cannot quarrel with his typology, although I realize the boundaries between the six items are fuzzy and that conceivably one could develop equally valid, but different, classifications. I have found it instructive to rate mathematics teachers in general, myself in particular, and other teachers _I_ have known in terms of his six items. The items are listed here for future reference:

1. Expert,
2. Formal authority,
3. Socializing agent,
4. Facilitator,
5. Ego ideal,
6. Person.

In general, I suspect that mathematicians tend to overemphasize the first two items and fail most often on the fourth. Even the marginal master's level teacher of freshman and sophomore is sufficiently well trained and so obsessed with the model of his own graduate level teachers that he overplays the role of expert. The subject is particularly well adapted to easy "black and white" evaluation and to unrealistic demands and standards in grading. Overemphasis on the expert role almost inevitably leads to lecturing and "talking down" to the point where proper use of the facilitator role is very weak at least for the average student. There would of course be a wide variation in the ego ideal and person aspects, but I feel this variation would be no different for mathematics from what it is in any other field.

As for myself, I feel my strongest point is in the facilitator role, although I perhaps do play the expert and formal authority somewhat more than is needed. I try to avoid the socializing agent in beginning courses, but play it moderately in advanced courses and strongly in courses for teachers and prospective teachers. I feel that I am weakest in ther person role and just don't know about the ego ideal one.

For five years I was chairman of a large department and responsible for evaluation of many teachers. I have found it very instructive to evaluate the best and worst of them in term of Mann's classification. In all cases but one it seems to clarify the situation. Comments on some of them follow.

Best teacher.

1. Prof. D. Tends to underplay the formal authority role, but not too much. Moderately good as a facilitator. Very strong both as an ego ideal and person. He captures the students completely as a result of these two aspects, then plays the expert very well indeed.

2. Prof. B. Not overly strong in ego ideal or person, but maintaining very good balance between expert and facilitator. Average students admire and like Prof. D., but respect Prof. B.

3. Miss W. Very strong as person, somewhat weak as expert and formal authority. Students probably rate her more highly than do her colleagues.

4. Prof. G_1. Extremely strong as facilitator, well balanced in all others.

Worst teachers

1. Mr. S. Adequate as expert and facilitator, but weak in formal authority. Abysmal failure in ego ideal and person. This boy is a very brilliant mathematician, but his personality is such that he does not belong in teaching.

2. Mr. M. Adequate in ego ideal and person, but so over emphasizing expert and formal authority that facilitator is very weak.

3. Mr Y. Excessive over emphasis of expert and socializing agent at expense of facilitator. This so alienates students that they cannot reallistically see him as ego ideal or person, in both of which he is quite adequate.

4. Prof. G_2. Very good for brilliant students, but poor for others. He has good balance between facilitator and expert, but is much too strong as formal authority. His personality is peculiar with the result that different people react very differently to him.

This is probably the heart of the matter. This personality is the cause of constant friction with colleagues, and it may well be that they all tend to rate him lower than his students do.

B. On Dr. Frank Williams

1. James Kennedy

There appears to be a striking similarity between Frank Williams' description of creative people and the characteristics of students who use the Library's reference collection most intensively. Creative people were reported to have an insatiable appetite for facts, and they enjoy problem solving. These two motives are also apparent among students who frequently use the Reference Area.

This observation suggests several strategies for improving reference service and library instruction. Since creative students enjoy problem solving, library instruction would be more effective if it were a demonstration in problem solving. Since creative students may be expected to undertake independent study programs, including Program II, these students should perhaps be made known to the librarians and receive library instruction appropriate to their needs and talents. Since creative students have been shown to prefer to work independently, it may be best not to offer them reference help, but wait for them to ask for help.

Of course, all the above strategies suggest that creative students can be identified either intuitively, by tests, or by the grapevine. This is a subject to be discussed with the Office of Educational Research.

If creative students do respond best to special teaching methods, then this fact would require me to study the matter much more fully than was possible during Frank Williams' brief visit.

[redacted]

2. William Fishback

To a mathematician the research reported on by Frank Williams is not particularly impressive-at least at the present state of development. This does not imply that it is useless=simply that it is still in such an early state of development as to be of limited value to an individual teacher in the class room. If the number of variables is as large as it seems to be, it may well be questioned how much the results can ever so be used. I would suspect that the ultimate results might best be applied by experts in the construction of texts, films, and other learning materials. Some of the research _is_ suspect: the report from Berkeley that the creators find their professional niches and do their best work in middle age is in clear contradiction with the facts, at least in the sciences (see, for example, Lehman's _Age and Achievement_).

Some of Williams' remarks were interesting and applicable in a math class. His statement that the highly creative did not respond to the discovery method was at first questionable. However, this method involves slow progress and a certain amount of spoon feeding in terms of the direction needed; these people need a faster pace and don't need the babying involved. The advice to feed the good student seems obvious. I have never felt it out of order to take very brief digressions in class for their benefit. One doesn't need to say much to get them started, and the average student "turns off" and doesn't seem to resent the interruption. Such digressions are frequently followed by further questions and/or discussion by the good student after class. It certainly is the case that these students do respond to paradoxes, provocative questions, and the like.

The problem of creativety in mathematics cannot be divorced from ability. Many students lack the ability needed to do much on their own, and there is probably little one can do to make them highly creative. It certainly is the case however that much of the "modern" curricular approaches, emphasizing reasoning, discover, etc., over mechanics and rote memorization should tend to develop more efficiently the creative powers of the average student. The mathematician cannot separate the issue from that of research and the development of creative powers in those with high ability and professional commitment to the field.

This inevitably leads mathematicians to a discussion of the "Moore Method" of teaching. R. L. Moore is a topologist of note at the University of Texas. His students have dominated an area of mathematical research, and Moore's percentage of research-active students is abnormally high. Many of these students teach themselves by the Moore method and are having similar success. Moore insists that the beginning student be totally ignorant in the subject. The students are given the needed axioms and definitions and turned loose to create the field themselves with very little guidance. The beginning grad student thus starts with the foundations of the subject and proceeds over a period of continuous participation in the program of three years or so. At the end he has actually progressed to the point where part of his "homework" is actually his doctoral dissertation. At one time Fawcett tried similar approaches with some success in the geometry course at the University High School at Ohio State. The disadvantage of such a procedure is the time it takes to get material mastered compared to traditional lecturing. One criticism of the products of the Moore school is that they are often very narrow in their mathe ematical knowledge in view of the large amount of time they have spent in this activity. Teachers have been reluctant at the undergraduate level to try such methods in view of the increasing amount of materials graduate departments are demanding for admission. In view of the explosive growth of mathematics and the possible obsolescence of any specific material in any course after a few years, it might well be argued that the creative power developed by the method is of more importance in the long run and that there should be room in the undergraduate major for some exposure to the Moore procedure.

Appendix E

Final Comments of Participants

1. Doug Steeples

Participation in the seminar was a valuable experience for me. It provided at several points theoretical undergirding and methodological material of considerable usefulness in teaching. I would suggest one or two ways in which the seminar might have been improved. The first entails an effort to assure greater uniformity in the caliber of speakers, and the second which I think is considerably more important, would involve developing a more coherent core around which such a seminar might be built. It appeared to me, at times, that there was insufficient coherence in the seminar, that the topics might have been organized and grouped to build more logically one from another, and that if this had been done the impact of the seminar and its effectiveness might have been greatly increased.

I, personally, am very grateful for having had an opportunity to participate in such a seminar and would welcome similar opportunities in the future.

2. Jane Miller

This was an excellent approach to adjustment of teaching procedure and generated much comment among faculty involved as well as students encouraged to attend the sessions. The definitive point of success in such a seminar depends on the nature of the speakers involved. So long as good men canbe attracted to participate, interest and progress is generated. Of the four offered this year, Sanford and Mann were to my mind, outstanding. Of the others, Alshuler was interesting and provided a neat takeoff for my classes in Social Psych if he failed to teach me much in the way of educational methodology. The Williams presentation was a disappointment, as I have already indicated.

Worthwhile aspects of the seminar, them, would be first, generation of dialogue among faculty and students on the problem of learning and teaching. Secondly, the valuable insights derived by the individual instructor into the teaching process, or contributions of significant theoretical structure which might provide a broader frame of reference toward teaching and learning.

The seminar might have been improved by the addition of an introductory session in learning theory from a theoretical point of view. This might have been accomplished by a panel of educators and psychologists from our own faculty to acquaint those in other disciplines with the present status of theory and research in learning. As a psychologist, I found some difficulty in communication with other faculty whose concepts of learning were more broad and considerably lacking in operational or theoretical concepts common to the study of learning as a psychological process. Communication with interested students was much better for me since those who attended were psychology or education majors with a frame of reference and vocabulary similar to mine.

It seems to me greatly advisable to conduct such a seminar in this or any other college. As college level teachers, we eften are untrained in the techniques of teaching per se, and it is the communication of information about our respective subject fields on which the education of students turns. No matter how well prepared or highly trained the teacher may be, his success depends on how well he can teach what he knows, and this is what all of us need help in learning to do. The Mann approach seems to me to be the most useful and helpful to the college level teacher.

As a modified version, the best suggestion I can make is to begin with a panel discussion as described above, and spend the remainder of the year doing research and discussion on the Michigan method as presented by Mann. Establishment of local norms, polishing of the questionnaire to reflect Earlham student language and approach, and well planned longitudinal studies using this framework would be highly instructive.

It seems to me also, that many faculty who should have been involved in the seminar were not in attendance. How one could go about involving a larger percentage of faculty people simply to come to listen and discuss, even if non-participating, is a difficult question. Perhaps administrative pressure judiciously applied, the involvement of department chairmen who are likely to pass the information along or exert subtile pressure on their collegues to attend might be a start.

In conclusion, let me repeat, I found this to be most worthwhile, stimulating and in the case of two of the speakers, provided challenging insights. I hope the project will be extended next year into definitive research on teaching role using the Michigan approach, and involving extensive faculty participation.

3, Fred Grohsmeyer

(a) As a psychologist, the seminar served the additional purpose of a refresher. In many cases the experimental designs and the theoretical implications were interesting but for non-psychologists there were probably less meaningful.

(b) Avoid too much theory . . . practical application and relevance more important for most faculty.

(c) Seminar well worthwhile . . . . should be continued in some form . . . and here!

No particular criticisms or suggestions come to mind. All things considered (tight schedule, etc.) it was well handled and worthwhile.

4. Chuck Martin

My reactions to the Learning Theory Seminar are varied, and based on active participation only during 1965-66. While I found most of the presentations and discussions interesting, I was at the same time frustrated. Relatively little of what was presented during 1965-66 was of practical value to me in my particular classroom or laboratory situation. What I need and want to know is how to be a more effective teacher of geology. Perhaps research on the topic of learning has not yet progressed to the stage where such answers are available, but if it has, or if there are any preliminary indications, future seminars might place more emphasis upon this. Of particular interest to me and probably other scientists is any information bearing upon laboratory or experimental situations.

I am glad I participated, and found the arrangements, scheduling, etc. entirely satisfactory.

5. Bob Brewster

My reactions to the Faculty Learning Theory Seminar are as follows:

   1. Earlham faculty/participants in the Seminar brought greatly varying amounts of pre-knowledge about Learning Theory to the Seminar.

      a. Use of of required reading list would have brought some common knowledge to focus the discussions.

      b. More extensive introduction of the specialists who came on campus, through bibliography of their publications, would have aided the background for the discussion.

   2. The seminar on learning motivation, by the authority from Berkeley, California, had a profound effect on the layman (see my previous report). It made one re-think the purposes of one's course in terms of the motivation of the student. Also, the point made that the instructor would be well-advised to state to the class what motivated him to enter his field of learning (the teacher's field), was one which this participant had not thought of before.

   3. Generally, the value of the Seminar was good, but it might have been structured a little more highly.

6. Jim Kennedy

   1) Worthwhile aspects.
      $100 reward helped motivation.
      Writing reports forced me to think about the speakers' relation to my work.
      Some speakers were both relevant and stimulating, e.g. McKeachie.

   2) Procedures to be avoided.
      Beware of speakers without a message relevant to our interests, e.g. the creativity man.
      Don't let speakers come without informing participants about their subjects, perhaps via a 2 page memo.

3) I found it helpful. The seminar could continue here by taking up more topics, e.g. problem solving, group dynamics, discussion group leadership.

4) Other approaches to teaching and learning. Sharing insights between participants via leader's summary report written after each participant has turned in his report; or discussion by participants.